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(54) **METHOD OF MULTIVARIATE SPECTRAL ANALYSIS**

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(57) **ABSTRACT**

A method of determining the properties of a sample from measured spectral data collected from the sample by performing a multivariate spectral analysis. The method can include: generating a two-dimensional matrix A containing measured spectral data; providing a weighted spectral data matrix D by performing a weighting operation on matrix A; factoring D into the product of two matrices, C and S^T, by performing a constrained alternating least-squares analysis of $D = CS^T$, where C is a concentration intensity matrix and S is a spectral shapes matrix; unweighting C and S by applying the inverse of the weighting used previously; and determining the properties of the sample by inspecting C and S. This method can be used to analyze X-ray spectral data generated by operating a Scanning Electron Microscope (SEM) with an attached Energy Dispersive Spectrometer (EDS).

106 Claims, 21 Drawing Sheets

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